Voyager Bulletin

MISSION STATUS REPORT NO. 42 MAY 11, 1979

IMPACTS — Numerous bright ray craters and odd, grooved structures pock the surface of Ganymede, Jupiter's largest satellite. The brightness of the craters, their ejected material, and the grooves may indicate the presence of younger, "cleaner" ice which has not yet been darkened by micrometeoride bombardment. The large, bright ray crater (south of top photo, north of bottom photo) has ejecta rays extending as far as 300 to 500 km (185 to 310 mi). These two photos, taken by Voyager 1 on March 5 from a range of 230 to 250 thousand km (143 to 155 thousand mi), have a resolution of about 4.5 km (2.8 mi) and may be mosaicked by fitting matching features together.

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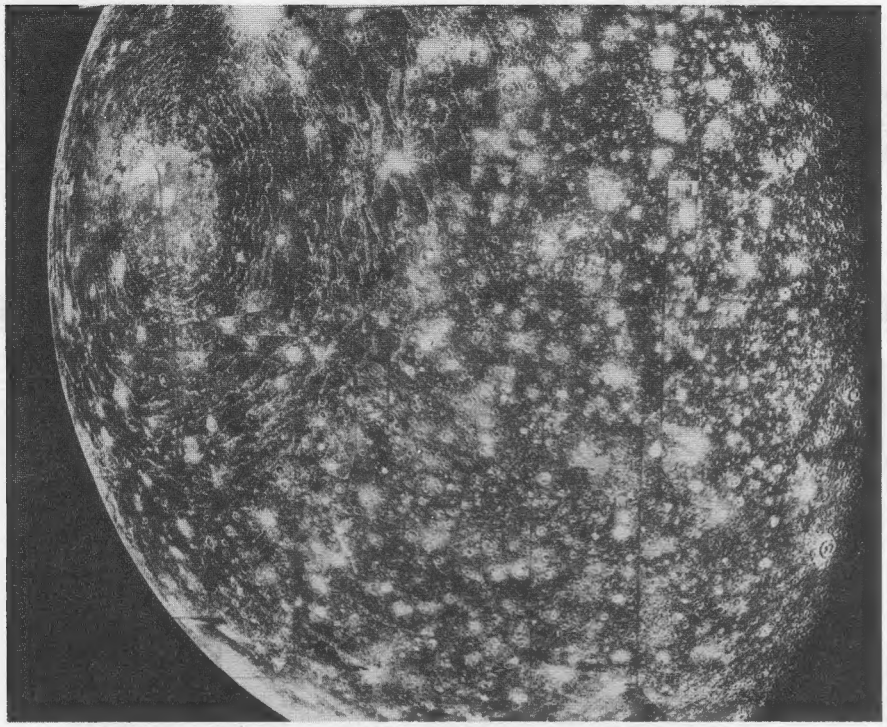
Voyager 2: Jupiter Minus 59 Days
Voyager 1: Saturn Minus 551 Days

Recorded Mission Status (213) 354-7237
Status Bulletin Editor (213) 354-4438
Public Information Office (213) 354-5011



QUICK FROZEN – Heavily-cratered Callisto is the outermost, darkest, and probably the oldest surface of Jupiter's Galilean satellites. While it is thought to have a muddy or rocky core with an icy crust, its surface is densely covered with impact craters ranging in size from 20 to 50 km (12 to 30 mi) in diameter, with very few larger ones. The lack of large craters indicates that Callisto lacks firm enough crustal foundations to support mountains or chasms, since ice sinks and flows under heavy loads. An exception to the small craters is the large impact basin (left) with numerous concentric rings rippling outward from its center. Extending more than 1000 km (620 mi) outward from the 600 km (370 mi) basin, the ripples probably were formed as the fragile, icy crust heaved under the impact of a large meteorite and then quickly froze again in the cold, airless environment.

B.V. (before Voyager), the two largest and outermost Galilean satellites, Ganymede and Callisto, were thought to be very similar. Both are larger than the planet Mercury. Both are relatively dark (but not as dark as Earth's moon), indicating a surface covered with dark rock rather than white ice. Both are very lightweight, however, having a density about twice that of water – inconsistent with a rocky composition.

There the similarities begin to end. Callisto has perhaps the most ancient surface of any of Jupiter's Galilean satellites. Its crust is cratered like that of Mercury, indicating little recent change. Countless impact craters mar its surface, probably the result of meteorite bombardment over the past four billion years. It is mountainless. The features are shallow – there are no sharp rims or deep canyons. Questions arise: Could it be that Callisto's crust is not strong enough to support geological relief? That mountains sink and canyons rise on a sea of slush?

One explanation is that Callisto has a muddy or rocky core, with an icy crust floating on a sea of warmer ice. At times, the warmer ice leaks out of the interior, freezing on the surface at temperatures more than 200 degrees below zero (Fahrenheit). Splattered meteorites and captured interplanetary dust coat the surface with dark debris, accounting for the darkness of the satellite.

Ganymede's surface may be only a quarter as ancient as its sister – perhaps only one billion years old – since its crust shows much more evidence of recent change. Its icy surface lacks the numbers of impact craters, and the existing ones are surrounded by bright rays of material tossed out by the impact of meteorites. The bright spots might be fresh ice, while the dark ones could be "dirt" gouged out of internal material.

But the intriguing features on Ganymede are the sinuous systems of ridges and grooves traversing the surface like so many tire tracks. Some of these cracks display offsets similar to shifts in streets and streams caused on Earth by crust movement or Earthquakes, implying that the same sort of processes exist on Ganymede. Some areas of the satellite appear to have piled-up crustal segments similar to ice jams at Earth's polar regions.

Crustal movements on Earth are caused by convection cells generated by heat from the core. There may have been, or perhaps still is, enough heat from radioactive elements within Ganymede to warm the mantle, create convective currents, and thus crack the icy crust.

Voyager 2 in Observatory Phase

Images of Jupiter now being obtained every two hours by Voyager 2 will be used to create a time-lapse movie sequence of the Great Red Spot. The movie will cover the period from April 24 to May 27, as the spacecraft zooms 21 million km (13 million mi) closer to the giant planet, and will show large-scale changes in the atmosphere since Voyager 1's visit.

In addition to the imaging, Jovian-system scans in the ultraviolet and field and particle measurements of the solar wind near Jupiter comprise most of the spacecraft's daily routine thoughout May. Calibrations of other instruments and measurements of the radio emissions are also performed regularly.

A trajectory correction maneuver is planned for May 25 to adjust the spacecraft's aiming point, and a fourth maneuver is planned in late June just 12 days before closest approach to the planet.